

What is claimed is:

1 1. A method for provisioning a service node of a packet network that
2 connects virtual private network (VPN) sites, said packet network comprised of a
3 plurality of service nodes, each service node comprising at least one Provider Edge (PE)
4 router and at least one Flow Record Processor (FRP), the method comprising the steps of:
5 downloading a set of configuration files from a Matrix Generator (MG) server to
6 the at least one FRP, said set of configuration files specifying measurement intervals for
7 traffic matrixes which are to be generated, said traffic matrixes describing distributions of
8 packet flows;
9 uploading Border Gateway Protocol (BGP) and Route Distinguisher (RD) Tables
10 from the at least one PE router to the at least one FRP;
11 exporting flow records from the at least one PE router to the at least one FRP;
12 receiving and processing said flow records at the at least one FRP;
13 generating partial traffic matrixes at said at least one FRP;
14 uploading partial traffic matrixes from the at least one FRP to the MG;
15 computing a total traffic matrix for a measurement interval by summing the
16 partial traffic matrixes for said measurement interval;
17 determining whether the service node has adequate capacity based on the traffic
18 patterns established from the generated traffic matrixes; and if the capacity is not
19 adequate, rerouting future flows to establish adequate capacity.

1 2. The method of claim 1 wherein the configuration files comprise a start
2 time and duration for the measurement interval.

1 3. The method of claim 2 wherein the measurement interval comprises one or
2 more intervals that occur at a designated day and time every week.

1 4. The method of claim 2 wherein the measurement interval includes a designated
2 date and time.

1 5. The method of claim 2 wherein measurements for the measurement interval
2 are generated on a continuous basis.

1 6. The method of claim 2 wherein the configuration files are expressed in
2 Extensible Markup Language (XML).

1 7. The method of claim 1 wherein the configuration files include a name for the
2 service node, a name and address for the at least one FRP, and a name and address for the
3 at least one PE router.

1 8. The method of claim 7 wherein the configuration files are expressed in
2 Extensible Markup Language (XML).

1 9. The method of claim 1 wherein the at least one FRP comprises software to
2 receive flow records exported by the at least one PE router.

1 10. The method of claim 9 wherein the at least one PE router exports flow
2 records to the at least one FRP for incoming flows from customer edge (CE) routers.

1 11. The method of claim 9 wherein the at least one FRP determines if a flow
2 record is received within the measurement interval by comparing a start time and end
3 time of the measurement interval with a time corresponding to the receipt of the flow
4 record.

1 12. The method of claim 9 wherein the step of receiving and processing said flow
2 records at the at least one FRP further comprises the step of creating an ingress record for
3 an incoming flow.

1 13. The method of claim 12 wherein each ingress record comprises an ingress PE
2 router loopback address.

1 14. The method of claim 12 wherein each ingress record comprises an ingress PE
2 router input interface address.

1 15. The method of claim 12 wherein each ingress record comprises a source
2 address.

1 16. The method of claim 12 wherein each ingress record comprises a destination
2 address.

1 17. The method of claim 12 wherein each ingress record comprises a type-of-
2 service indicator.

1 18. The method of claim 12 wherein each ingress record comprises a byte count.

1 19. The method of claim 12 wherein each ingress record comprises a packet
2 count.

1 20. The method of claim 12 wherein each ingress record comprises an egress PE
2 router name.

1 21. The method of claim 20 wherein the egress PE router name in the ingress
2 record is initialized to empty.

1 22. The method of claim 21 wherein the step of generating partial traffic matrixes
2 further comprises the step of storing ingress records generated during the measurement
3 interval in ingress files.

1 23. The method of claim 22 wherein the at least one FRP creates separate ingress
2 files for the at least one PE router associated with the at least one FRP.

1 24. The method of claim 23 wherein the step of generating partial traffic matrixes
2 further comprises the step of processing each ingress record.

1 25. The method of claim 24 wherein the step of generating partial traffic matrixes
2 further comprises the step of mapping the input interface address to a route distinguisher
3 via the RD table for the at least one PE router.

1 26. The method of claim 25 wherein the step of generating partial traffic matrixes
2 further comprises the step of prefixing the destination address with the route distinguisher
3 to create a VPN-IPV4 address.

1 27. The method of claim 26 wherein the step of generating partial traffic matrixes
2 further comprises the step of mapping the VPN-IPV4 address to a BGP next hop address
3 via the BGP table for the at least one PE router.

1 28. The method of claim 27 wherein the step of generating partial traffic matrixes
2 further comprises the step of mapping the BGP next hop address to an egress PE router
3 name via the configuration file.

1 29. The method of claim 28 wherein the egress PE router name in the ingress
2 record is updated.

1 30. The method of claim 29 wherein the step of generating partial traffic matrixes
2 further comprises the step of reading a PE router definition from the configuration file.

1 31. The method of claim 30 wherein the step of generating partial traffic matrixes
2 further comprises the step of selecting all records with a matching PE router name.

1 32. The method of claim 31 wherein the step of generating partial traffic matrixes
2 further comprises the step of computing the total byte and packet counts for each type-of-
3 service from the selected records.

- 1 33. The method of claim 32 wherein the step of generating partial traffic matrixes
- 2 further comprises the step of saving the total byte and packet counts in an element of the
- 3 partial traffic matrix.